



What's new in the management of glaucoma?

Lifestyle adjustments may reduce the risk of glaucoma

BY JO KOPPENS & BENJAMIN LAHOOD*

There is a common theme in medicine - a healthy life style may give some protection to many diseases of the body. Take heart disease or stroke, for example. Eating a healthy diet (fruits and vegetables, omega-3 oils, reducing saturated fats), maintaining a healthy weight and blood pressure, exercising regularly, and not smoking, have been shown to reduce this risk.

So, what about eye disease? A diet rich in vitamins and omega-3 oils can reduce the risk of wet age-related macular degeneration (AMD) in the high risk group. Smoking is associated with choroidal neovascular membranes. A diet lacking in vitamins may increase the risk of cataracts, as seen in a Chinese rural commune, where villagers treated with multivitamins had a reduction in cataract development.

And glaucoma you ask? People often ask if they can do anything to prevent or reduce the progression of glaucoma. Currently, lowering the intraocular pressure is the only management that is shown to slow the progression of glaucoma, confirmed by randomized controlled studies.

There are many risk factors for glaucoma that we cannot alter, such as family history, gender, race, and increasing age. Are there any modifiable risk factors?

POSSIBLE MODIFIABLE RISK FACTORS

a. Aerobic exercise lowers IOP

Aerobic exercise (walking, jogging or cycling) lowers IOP, even after 5 minutes. This reduction in IOP is more pronounced with longer duration and higher intensity exercise. The effect may be greater in individuals with glaucoma, rather than normal eyes. (1)

Once regular exercise is established (for at least 3 months), this IOP lowering effect continues for up to 3 weeks after cessation of exercise. (2) Physically fit individuals have a lower baseline IOP, but get much less additional lowering of IOP with exercise. (3)

Of significant importance is that this reduction is additive to the effect of any topical IOP lowering medications, suggesting that the mechanism of IOP lowering may differ from that of medications. (4)

Exercise also lowers blood pressure, and systemic hypertension is associated with glaucoma, so there may be another indirect benefit of exercise and glaucoma.

It must be remembered that in pigment dispersion, aerobic exercise may have the opposite effect, where aerobic exercise may increase IOP when pigment is dispersed. Also, in some young patients with advanced field loss, there can be a "vascular steal", with transient vision loss with exercise.

Note: aerobic exercise differs from weight lifting and yoga, which may increase IOP.



Figure 1: Stationary cycling

b. Antioxidants

Oxidative damage is a likely contributor to glaucomatous damage, believed to affect both the trabecular meshwork and the optic nerve. Some foods contain antioxidants, so theoretically some foods may reduce the risk of glaucoma.

The Study of Osteoporotic Fractures showed a decreased risk of glaucoma in women (mean age of 79 years) who consumed:

- one serving of green collards and kales per month (69% reduced risk) (rich in vitamins A, C, B2, and β-carotene);

- more than two servings of carrots per week (64% reduced risk) (rich in vitamin A, and α- and β-carotenes); and,
 - at least one serving of canned or dried peaches per week (47% reduction) (rich in vitamin A).
- when compared to those women who consumed less. (5)



Figure 2: Carrots



Figure 3: Canned peaches

There was a surprising finding, and although it was not statistically significant, the trend was that one serving of orange juice per day (rich in vitamin C and cryptoxanthin), may increase the risk of glaucoma by 70%.

The Nurses' Health Study (n=76,200) and the Health Professionals Follow-up Study (n=40,284) found no statistical significance for risk of glaucoma relative to dietary intake of α- or β-carotene, β-cryptoxanthin, lycopene, lutein/zeaxanthin, vitamin C, E or A. However, this group was significantly younger (mean age: 50 years and 55 years, consecutively) and would be expected to have a lower prevalence of glaucoma. (6)

These studies indicate that further research is needed.

c. Cholesterol

i. Dietary

Prostaglandin F2α analogues (latanoprost, bimatoprost and travaprost) are effective ocular hypotensives. Dietary fatty acids affect endogenous prostaglandin F2α levels, and hence may influence intraocular pressure.

A diet high in omega-6 and low in omega-3 oils may reduce the risk of POAG, particularly in high-tension POAG. (7) Another study showed both omega-3 and -6 reduced the risk of POAG.

ii. Medical lowering of cholesterol

Use of a cholesterol lowering medication (statin or non-statin) for more than 24 months has been shown to reduce the risk of glaucoma. (8)

d. Body mass index (BMI) and obesity

A higher BMI has been associated with ocular hypertension, but there is conflicting evidence about the association with glaucoma. A high BMI is associated with sleep apnoea.

e. Sleep apnoea

Sleep apnoea syndrome (SAS) is associated with glaucoma. SAS is the repetitive collapse of the pharyngeal airway during sleep, lasting up to 1 minute. Obstruction ends with arousal from sleep, causing sleep disturbance. Due to the poor quality of sleep, patients have chronic fatigue, daytime sleepiness and reduced cognitive function. People are more at risk for SAS if they are male, obese, snore, drink excessive alcohol, and smoke.

Overweight patients with glaucoma suspected of SAS should be referred for assessment.

f. Smoking

Although no study has found an association between glaucoma and past history of smoking, current smoking is possibly related to glaucoma risk, as shown in a meta-analysis. (9)

Any current smokers should be given smoking cessation advice, and if interested, referred to their GP or www.quit.co.nz

g. Socioeconomic status

Greater knowledge of glaucoma is associated with higher education and higher income. Individuals with advanced glaucoma are more likely to be of lower socioeconomic status (SES). Low SES may result in reduced access to ophthalmic care, late diagnosis, and some individuals may have negative attitudes and poor understanding of treatment.

Low SES cannot be quickly or easily improved. However, being aware of this association can aid health professionals or government initiatives in

targeting those in need, and improve education.

h. Excessive water drinking

Many patients with glaucoma will have a significant rise in intraocular pressure after drinking a high volume of water (1L) over a short time period (15minutes). Kerr and Danesh-Meyer found that the mean maximum increase in IOP was greater for a 1L volume (4.5mmHg), but still present for 500ml (3.3mmHg) of water. Glaucoma patients should probably be discouraged from ingesting large volumes of fluid rapidly. (10)

i. Coffee

Caffeinated coffee is known to elevate IOP. Some studies have shown a probable association with glaucoma, while others have only correlated caffeine intake with ocular hypertension. It seems safer to ingest caffeine in moderation, although further evidence is still required. (11, 12)

j. Alcohol

Alcohol has a dose-related IOP lowering effect, but there is some evidence that daily alcohol causes a slight elevation in IOP. No studies can comment on glaucoma progression.

k. High blood pressure

Untreated systemic hypertension is associated with glaucoma. This is not a direct association, rather indirect, possibly due to atherosclerotic damage to ocular vessels.

l. Low blood pressure

Some glaucoma patients with progressive field loss despite adequately controlled IOP have excessive early morning dips in blood pressure. 24-hour blood pressure monitoring may identify early morning dippers, particularly those patients on BP medications who may be over-medicated

m. Marijuana

For completeness, marijuana is known to lower IOP. However, the continuous dosing required to control glaucomatous IOP would have significant systemic toxic effects. It is also illegal. We await research on topical treatments of similar chemical structures.

n. Increasing intraorbital pressure – playing wind instruments, tight neck ties

IOP can almost double within 20 seconds when playing a wind instrument, but returns to baseline almost immediately. Tight neckties cause a small increase in IOP (2mmHg), but this does not persist with continued wear. There are no studies that investigate the impact on glaucoma.

SUMMARY

Several lifestyle factors affect IOP, but there is insufficient evidence about whether these changes influence glaucoma progression. As there is significant evidence that these lifestyle changes are good for general health, and they seem unlikely to cause more glaucomatous damage, we advocate a good healthy lifestyle.

In particular, regular aerobic exercise should be encouraged, along with a healthy diet, weight and blood pressure. Smoking cessation makes good sense. It seems wise to avoid drinking water, coffee or alcohol excessively, and to use moderation when lifting heavy weights, playing wind instruments, and head-down yoga positions. And finally, glaucoma education can only be a good thing.

The associations of these life style alterations are complex, and hence further studies are required.

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Technology developer warns 3D TV may cause permanent vision damage

In the early 90s, Mark Pesce started one of the first virtual reality companies working closely with Sega to develop a virtual reality headset using parallax, the same technology being employed by 3D TV makers today. Sega never released the display Pesce helped develop because, he says, lab testing determined long-term exposure to parallax can cause a depth perception disorder called 'binocular dysphoria', which he believes can become permanent. The study found that a significant percentage of users maintained depth perception issues anywhere from 15 minutes to hours after taking the headset off. He claims children, whose brains are highly malleable, are particularly at risk.

Pesce explains parallax technology projects 'a slightly different image to each one of your eyes, and from that difference, your brain creates the illusion of depth. That sounds fine, until you realize just how complicated human depth perception really is. The Wikipedia entry on depth perception lists ten different cues that your brain uses to figure out exactly how far away something is. Parallax is just one of them. Since the various movie and television display technologies only offer parallax-based depth cues, the brain basically has to ignore several other

cues while one is immersed in the world of a 3D movie'.

Today, Pesce is working to spread the word about dangers he says are largely being ignored by consumer electronics makers. In a blog post, Pesce predicts 'one of two things is about to happen' as risks of 3D TV become more known; 'either 3D television will quickly and quietly disappear from the market, from product announcements, and from broadcast plans, or we'll soon see the biggest class-action lawsuit in the planet's history, as millions of children around the world realise that their televisions permanently ruined their depth perception. Let's hope 3D in the home dies a quiet death'.



Is 3D here to stay?